

# ***A Blueprint for Learning Mathematics Eighth Grade***

The *Blueprint for Learning* is a companion document for the Tennessee Curriculum Standards which are located at [www.tennessee.gov/education](http://www.tennessee.gov/education). Although the curriculum adopted by the State Board of Education in its entirety remains on the web for additional reference, this reformatted version makes the curriculum more accessible to classroom teachers.

## **Key features of the reformatted version are:**

- All grades for each content area are provided in the printed manual.
- The skills within each grade are identified as to whether they are introduced, developed, or have been mastered and are now being maintained at that level.
- The skills correlating with the state criterion referenced test (CRT) are also identified for classroom instruction.
- In the Language Arts section, the assessed skills (performance indicators) are identified not only for the state's CRT in grades 3-8 but also for the writing assessment in grades 5 and 8.
- This guide makes the planning of instruction for students with varying abilities easier to accomplish.
- Teachers can plan and work together to improve school wide student achievement through curriculum integration across content areas and grade levels.
- Teachers can identify current grade level skills as well as those needed to prepare students for the next year.

## **Skills are coded and identified as Introduced (I), Developing (D), State CRT and Writing Assessed (A), and Mastered and Maintained (M).**

- Introduced (I) skills are new skills presented at that grade level. Even though a skill is considered introduced at a grade level, some development would also occur.
- Developing (D) skills are skills that have been introduced at a previous grade level. At this stage of development the skills are being refined and expanded.
- Assessed (A) skills are those skills that are correlated to the state performance indicators for the CRT portion of the achievement test (grades 3-8) and the writing assessment (grades 5 and 8). The identified skills are formally assessed through the CRT; however, all skills are informally assessed in the classroom.
  - For the purpose of data reporting, assessed (A) skills are grouped into categories indicating related skills and knowledge. For example, grammar, mechanics, and usage are grouped together under the grammar (G) category. Each state assessed indicator included on the Blueprint carries a legend showing that it is assessed and indicating the category in which it will be reported (e.g., Assessed/Grammar=A/G).
- Mastered and Maintained (M) indicates a skill that has been introduced, developed, and assessed. Even though a skill may be formally assessed, the development and expansion of the skill still continues.

### **KEY**

**I = Introduced D = Developing A = State Assessed M = Mastered**

### **REPORTING CATEGORY**

**N = Number & Operations AT = Algebraic Thinking C = Computation R = Real World Problem Solving  
DP = Data Analysis & Probability ME = Measurement G = Geometry GR = Graphs & Graphing**

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## **MATHEMATICS** **Eighth Grade**

### **NUMBER AND OPERATIONS**

*The student will identify, represent, order, and compare numbers; and estimate, compute, and solve problems.*

<b>Key</b>	<b>Reporting Category</b>	
<b>M</b>		Recognize the place value of a given digit.
<b>I</b>		Use exponents to express a monomial written in expanded form.
<b>A</b>	<b>N</b>	Determine the square roots of perfect squares (<169).
<b>D</b>		Use a variety of models to demonstrate the relationships within the real number system (e.g., Venn diagrams and webs).
<b>A</b>	<b>R</b>	Work flexibly with fractions, decimals, and percents to solve one- and two-step word problems.
<b>D</b>		Compare and order fractions, decimals, and percents.
<b>A</b>	<b>N</b>	Compare rational numbers using the appropriate symbol (<, >, and =).
<b>D</b>		Locate and specify whole numbers, fractions, decimals, percents, and integers on the number line.
<b>A</b>	<b>N</b>	Determine the approximate locations of rational numbers on a number line.
<b>D</b>		Develop meaning for percents greater than 100 and less than one and identify examples.
<b>M</b>		Use appropriate mathematical language and symbols to express numerical relationships (e.g., <, >, and =).
<b>D</b>		Understand and use ratios and proportions to represent quantitative relationships.
<b>A</b>	<b>N</b>	Use ratios and proportions to represent real-world situations (i.e., scale drawings and probability).
<b>A</b>	<b>N</b>	Use exponential, scientific, and calculator notation to represent large numbers in real-world situations.
<b>A</b>	<b>N</b>	Identify the opposite and the reciprocal of a rational number.
<b>M</b>		Use concrete, pictorial, and symbolic representations of integers.
<b>D</b>		Apply number theory concepts to solve problems (e.g., divisibility, factors, multiples, composite numbers, prime numbers, prime factorization, and relatively prime).
<b>D</b>		Understand the meaning and effects of arithmetic operations with fractions, decimals, and integers.
<b>M</b>		Use the associative and commutative properties of addition and multiplication to simplify computations with integers, fractions, and decimals.
<b>D</b>		Use the distributive property to simplify computations with integers, fractions, and decimals.
<b>A</b>	<b>N</b>	Apply order of operations in computing with rational numbers using no more than two parentheses and exponents 1 and 2.
<b>D</b>		Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and to solve problems.
<b>D</b>		Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, percents, and integers in problem-solving situations (e.g., mental computation, estimation, calculators, computers, and paper and pencil).
<b>A</b>	<b>N</b>	Compute efficiently and accurately with whole numbers, fractions, decimals, and percents.
<b>M</b>		Develop and analyze procedures for computing with fractions, decimals, and integers.
<b>A</b>	<b>N</b>	Use estimation strategies to select a reasonable solution to a real-world problem involving computing with rational numbers.

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<b>D</b>		Judge the reasonableness of the results of rational number estimates and computations.
<b>D</b>		Solve multi-step real-world problems involving whole numbers, fractions, decimals, and percents.
<b>D</b>		Solve multi-step real-world problems involving whole numbers, fractions, decimals, and percents.
<b>I</b>		Raise rational numbers to whole number powers.
<b>D</b>		Develop, analyze, explain, and use methods for solving problems involving proportions (e.g., scaling and finding equivalent ratios).
<b>A</b>	<b>R</b>	Calculate rates involving cost per unit to determine the best buy.

## ALGEBRA

*The student will analyze and use symbols to generalize patterns, use properties of operations, and analyze change in various situations.*

<b>D</b>		Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and (when possible) symbolic rules.
<b>A</b>	<b>AT</b>	Generalize a variety of patterns with symbolic rules.
<b>D</b>		Develop understanding for arithmetic and geometric sequences.
<b>D</b>		Relate and compare different forms of representation for a relationship.
<b>A</b>	<b>AT</b>	Represent situations and solve real-world problems using symbolic algebra.
<b>D</b>		Identify functions as linear or nonlinear.
<b>I</b>		Compare and contrast properties of functions from tables, graphs, or equations.
<b>A</b>	<b>AT</b>	Formulate multi-step equations that represent relationships and real-world situations.
<b>I</b>		Develop meaning for intercept and slope.
<b>I</b>		Use a variety of forms to represent linear relationships.
<b>A</b>	<b>AT</b>	Generate equivalent forms for simple algebraic expressions.
<b>D</b>		Recognize and generate equivalent forms for simple algebraic expressions.
<b>A</b>	<b>AT</b>	Evaluate a first-degree algebraic expression given values for two or more variables.
<b>A</b>	<b>AT</b>	Solve one- and two-step linear equations involving integers.
<b>D</b>		Use a variety of methods to solve real-world problems involving multi-step linear equations (e.g., manipulatives, technology, and paper and pencil).
<b>A</b>	<b>AT</b>	Apply given formulas to solve real-world problems.
<b>A</b>	<b>AT</b>	Solve one-step linear inequalities.
<b>A</b>	<b>GR</b>	Connect the appropriate graph to a linear equation.
<b>I</b>		Identify the graphical representation of the solution to a one-variable linear inequality.
<b>I</b>		Develop understanding for particular values of patterns, relationships, and functions (e.g., x- and y- intercepts, slope, and maximum and minimum values).
<b>D</b>		Use a variety of representations to solve real-world problems (e.g., graphs, tables, and equations).
<b>I</b>		Compare linear relationships to non-linear relationships.
<b>A</b>	<b>GR</b>	Connect symbolic expressions and graphs of lines.
<b>A</b>	<b>GR</b>	Interpret graphs which represent rates of change.
<b>D</b>		Develop meaning for rate of change in real-world situations.

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## GEOMETRY

*The student will analyze and describe characteristics and properties of 2- and 3-dimensional shapes, locate and specify points on a grid, and use geometric concepts (e.g., symmetry and transformations) and reasoning to solve problems.*

<b>D</b>		Describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties.
<b>A</b>	<b>G</b>	Classify types of two- and three-dimensional objects using their defining properties.
<b>A</b>	<b>G</b>	Identify relationships among the angles (i.e., complementary, supplementary, interior, exterior, vertical, and corresponding).
<b>D</b>		Understand relationships among the angles (e.g., complementary, supplementary, interior, exterior, vertical, and corresponding).
<b>A</b>	<b>G</b>	Solve problems using angle relationships (i.e., complementary, supplementary, interior, exterior, vertical, and corresponding).
<b>A</b>	<b>G</b>	Determine the measure of an angle of a triangle given the measures of the other two angles.
<b>A</b>	<b>G</b>	Apply relationships among the angles and side lengths of similar geometric figures.
<b>A</b>	<b>G</b>	Recognize similar geometric figures.
<b>D</b>		Determine congruence of line segments, angles, and polygons by direct comparison of given attributes.
<b>D</b>		Develop an understanding of the Pythagorean theorem and use it to solve real-world problems.
<b>D</b>		Graph points in the coordinate system.
<b>A</b>	<b>GR</b>	Use ordered pairs to describe given points in a coordinate system.
<b>D</b>		Describe sizes, positions, and orientations of shapes under transformations (e.g., rotations, translations, reflections, and dilations).
<b>D</b>		Relate symmetry and congruence to reflections about a line.
<b>D</b>		Use appropriate tools and methods to draw geometric objects with specified properties, (e.g., side lengths, and angle measure).
<b>D</b>		Use two-dimensional representations of three-dimensional objects to visualize.
<b>A</b>	<b>R</b>	Apply spatial reasoning and visualization to solve real-world problems.
<b>A</b>	<b>R</b>	Apply geometric ideas and relationships in areas outside the mathematics classroom (i.e., art, science, and everyday life).

## MEASUREMENT

*The student will determine time, length, perimeter, area, weight, capacity, and temperature and solve real-world problems involving measurement.*

<b>M</b>		Understand both metric and customary systems of measurement.
<b>A</b>	<b>ME</b>	Convert from one unit to another within the same system.
<b>A</b>	<b>ME</b>	Select units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.
<b>A</b>	<b>ME</b>	Estimate length, perimeter, circumference, area, and volume using a variety of strategies.
<b>D</b>		Select and apply techniques and tools to accurately measure length, perimeter, area, volume, and angles to appropriate levels of precision.
<b>A</b>	<b>ME</b>	Apply formulas to find the circumference and area of circles.
<b>A</b>	<b>ME</b>	Apply formulas to find the area of triangles, parallelograms, and trapezoids.
<b>A</b>	<b>ME</b>	Estimate or find the area of irregular and complex shapes.

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<b>I</b>		Apply given formulas to find volume of selected prisms and cylinders.
<b>D</b>		Compare and contrast the volumes of a variety of geometric solids.
<b>A</b>	<b>R</b>	Solve real-world problems involving rate/time/distance (i.e., $d = rt$ ).
<b>A</b>	<b>R</b>	Solve problems involving scale factors using ratios and proportion.
<b>A</b>	<b>ME</b>	Solve real-world problems using the Pythagorean theorem (no radicals).
<b>D</b>		Construct tables and graphs to represent rates of change.
<b>D</b>		Find measures using proportional relationships and properties of similar figures.
<b>D</b>		Determine the measures of angles by applying angle relationships (e.g., complementary, supplementary, interior, exterior, and vertical corresponding).

## DATA ANALYSIS AND PROBABILITY

*The student will collect, organize, analyze, interpret, and display data in tables and graphs and determine the probabilities of outcomes in simple experiments.*

<b>D</b>		Formulate questions, design studies, and collect real-world data for investigations using a variety of collection methods (e.g., random sampling and simulations).
<b>A</b>	<b>DP</b>	Interpret appropriate graphical representations of data (i.e., histograms, box plots, and scatterplots).
<b>D</b>		Select, create, and use appropriate graphical representations of real-world data (e.g., histograms, box plots, and scatterplots).
<b>D</b>		Determine and interpret measures of center and spread (e.g., mean, median, and interquartile range).
<b>A</b>	<b>DP</b>	Determine the mean of a given set of real-world data.
<b>A</b>	<b>DP</b>	Determine the median of a given set of real-world data (even number of data).
<b>I</b>		Develop meaning for frequency, distribution, and outliers.
<b>A</b>	<b>DP</b>	Connect data sets and their graphical representations (i.e., histograms, stem-and-leaf plots, box plots, and scatterplots).
<b>D</b>		Connect data sets and their graphical representations (e.g., bar graphs, line graphs, and circle graphs).
<b>A</b>	<b>GR</b>	Make conjectures and predictions based on data.
<b>A</b>	<b>DP</b>	Recognize misleading presentations of data.
<b>I</b>		Develop meaning for lines of best fit.
<b>A</b>	<b>DP</b>	Identify an appropriate sample to test a given hypothesis.
<b>D</b>		Make conjectures to formulate new questions for future studies.
<b>I</b>		Develop meaning of mutually exclusive events.
<b>A</b>	<b>DP</b>	Connect the symbolic representation of a probability to an experiment.
<b>D</b>		Use a variety of methods to compute probabilities for compound events (e.g., multiplication, organized lists, tree diagrams, and/or area models).
<b>I</b>		Distinguish between theoretical and experimental probability.
<b>D</b>		Find the probability of dependent and independent events.

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